SUBMITTED IN PARTIAL SATISFACTION OF
CONTRACT # DABT65-93-D-0002, DELIVERY ORDER 040

TO

MISSION CONTRACTING ACTIVITY
AND
BATTLE COMMAND BATTLE LABORATORY (BCBL)
COMBINED ARMS CENTER (CAC)

COMBAT INFORMATION CENTER (CIC) CONCEPT

January 2, 1996

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Submitted herewith are two copies of the "*Combat Information Center (CIC)*." The report is submitted in compliance with Contract No. DABT65-93-D-0002, Delivery Order 0040.

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Contract Title: Analytical Support to Combined Arms Center

Subcontract Number: DABT65-93-D-0002

Sponsoring Agency: Battle Command Battle Laboratory
U.S. Army Combined Arms Center
Fort Leavenworth, Kansas 66027-5300

Contracting Officer's Representative: Mr. Calvin Johnson

Submitted in Partial Satisfaction of:
Delivery Order 040

DIGITIZED BATTLE STAFF (DBS) FOLLOW-ON DEVELOPMENT, EXPERIMENTATION INSTRUCTIONAL MATERIALS DEVELOPMENT

DISCLAIMER

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1.1 PURPOSE

TRADOC Pamphlet 525-5, *The Force XXI Operational Concept*, identifies, describes, and justifies a need to "... begin now to change the way we think and organize staffs, information flow, procedures and possibly organizations." The Combat Information Center (CIC) concept meets this need by exploring how to optimize a heavy division staff's management of information in support of the commander's exercise of battle command. To achieve this objective, the CIC concept proposes introducing a new staff organization into the division headquarters (HQ). This organization's purpose is to focus exclusively upon solving the commander's and staff's information problem--that of culling through the mountains of available information to help commanders to make timely, accurate decisions.

1.2 BACKGROUND

The CIC concept responds to the threefold command post dilemmas that Army senior leaders identified during the Battle Command Assessment[1] (BCA). First,

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[1] The Battle Command Battle Laboratory at Fort Leavenworth commissioned the BCA, in early 1993, to determine the means to improve current headquarters and command post organizations of the heavy division and corps. This initiative responded to emerging thought on headquarters organizations contained in such documents as the Force Projection Army Command And Control Action Plan.

current heavy division command posts do not provide enough, or the right kinds, of support to commanders. Second, current heavy division command posts are too cumbersome. Third, current heavy division command posts, when doctrinally resourced and configured, do not provide commander's with the flexibility they require in responding to the unique requirements of their operational situation. The BCA demonstrated that the primary cause of these problems is the information fragmentation that staffs experience because of the way staffs organize to determine information requirements, gather information to meet those requirements, and ensure that key personnel have access to the information. See Annex A to this concept for a detailed discussion of the impact of information fragmentation.

1.2.1 The Approach

The CIC concept proposes solutions to these dilemmas by expanding upon the command center concept that division-level doctrine currently addresses. The command center, outlined in detail in chapter 2 of both FM 71-100-1 and FM 71-100-2, exists to provide the commander with all information needed for decisions. The command center is, however, often physically separated from the commander. Further, it relies upon information feeds from staff elements that also are separated in time, space, purpose, resources, and perspective. The CIC, in contrast, has the mission of gathering information from all sources (national, international, commercial, higher echelons, adjacent units, and subordinates), formulating the picture of the battlespace in the format the commander directs, and making that picture available to key personnel. Additionally, as the "information warehouse" for the division HQ, the CIC serves as the information repository and supermarket on which staff members rely for the most recent information to support their continuing situation estimates.

1.2.2 Objective

The core of the CIC concept is horizontal integration of information in the division HQ, using an organization designed around information processes. By focusing on information, the CIC releases the staff to concentrate upon supporting the commander's requirements to gain and maintain operational momentum. Thus, the CIC is the organization that answers the TRADOC Pamphlet 525-5 objective of freeing ". . . commanders and staffs to focus on . . . complex, integrative tasks."

1.3 DOCUMENT ORGANIZATION

This document contains three sections. Section 1 is this introduction. Section 2 outlines the basic concept and provides details of the organizational development principles that resulted in the CIC organization and functions. Section 3 contains the tactics, techniques, and procedures the CIC uses to do its job.

SECTION 2
BASIC CONCEPT

2.1 GENERAL

This section discusses the basic CIC concept. It begins with background information that puts the concept in context. The section also lists the assumptions upon which the concept is based.

2.2 COMMAND AND STAFF FUNCTIONS AND RELATIONSHIPS

Understanding the basis for the CIC concept requires a review of current command and staff relationships and functions. Several doctrinal publications, such as Field Manual (FM) 101-5, *Command And Control For Commanders And Staff*, Final Draft, August 1993, provide detailed explanations of current and future C2 doctrine, tactics, techniques, and procedures. The following is a macro-level review of the precepts of the CIC concept's departures from the current information processing doctrine.

2.2.1 Commanders' Functions

Commanders' functions fall into two broad categories. The first is the art of battle command--that is, the means and techniques commanders use to motivate and discipline their forces, assess the condition of their organizations, guide the activities of those organizations, and formulate the commander's independent, continuing estimate of the situation. The second broad category is the science of control. This is the generally

empirical, or pragmatic--and usually quantifiable--activities by which commanders engage in planning their forces' actions, assess the progress of their forces against the vision contained in the commanders' plans, and change (when required) their plans and/or their forces' actions in response to the mandates of unfolding reality. Of the two--art and science--the staff focuses the vast majority of its efforts in supporting the commander's exercise of the science of control.

2.2.2 Staff Support

2.2.2.1 Documented Support

According to FM 101-5, a staff supports the science of control with four products. First, it provides information to commanders and shares that information internally in the HQ and with other organizations, both vertically and horizontally. Second, a staff makes estimates of the sets of actions required to achieve a purpose and it recommends to commanders the most preferred sets. Third, based upon the commander's decisions, the staff prepares plans and orders. And fourth, a staff measures operational progress against planned requirements and, in the name of and as authorized by commanders, controls organizational behavior. It is on providing the first product, information, that the CIC focuses.

2.2.2.2 Other Support

While a fifth product is not explicitly addressed in FM 101-5, several senior leaders have outlined another product that a staff should provide in supporting the science of control. This fifth product is support to subordinate staffs--in two ways. First, a staff pushes support to subordinates. It does this by physical presence (e.g., staff representatives

go forward to a subordinate unit's command post (CP) to assist in detailed rehearsal and/or other preparations for an operation and, as appropriate, to assist in control of the operation [who better to assist in this control than those who understand all the hidden information that went into preparing, and is contained within, the plan?]). A staff also can support subordinate staffs via nonphysical media (e.g., electronic transmission of information). Second, a staff pulls support. It can guide a subordinate unit's staff searches for information by directing their inquiries into areas that the subordinate may have overlooked. Both staffs benefit from the information thereby gained. The CIC provides subordinates with information support primarily in the form of the force-level commander's relevant common picture (RCP).

2.2.3 Staff Processes

To achieve the five support products, staffs engage in four sets of inextricably intertwined activities, each of which this concept refers to as a staff process. The first process is the gathering and analysis of information on the status of their own, their supporting, other friendly, and adversary forces and/or organizations. This process occurs continuously, before planning, during planning, during operations and subsequent to them, for the purposes of measuring success and/or preparing for the next operation. Its objective is synthesis of an RCP of its own, of friendly, and of adversary forces and/or organizations. Second, staffs engage in the process of developing, analyzing, wargaming, and recommending courses of action and then plans. The third process occurs during operations. It is the process of adjusting the current plan (and the plan for the next operation) and associated force actions to reality as the current operation unfolds. Included in this third process are those actions associated with executing long-lead-time events, such as pre-positioning of special operations forces and satellite tasking. Also included is the detailed coordination required for success in highly complex actions, such as breaching, river

crossings, passages of lines, and deep operations. The fourth process, which permeates and is essential to the other three, is exchanging information. This exchange must occur both internally--among the vertically integrated, functional stovepipes that are major components of today's division and corps staffs--and externally with subordinate forces, higher echelons, adjacent organizations, and other organizations whose activities have an effect on the commander's battlespace (e.g., non-DOD U.S. government agencies, nongovernmental organizations, and/or private, volunteer organizations involved in an operations other than war environment). The CIC primarily engages in the staff processes of gathering and exchanging information.

2.2.3.1 Information Exchange

Inherent to the CIC's conduct of information management is the importance of information exchange to enable, enhance, and protect the commander's decision cycle. The exchange of information, both internally and externally, is a key staff process that directly influences the value of the staff products, as well as the efficiency of the other staff processes. The staff must conduct this information management process effectively to enable the commander and staff to function. Thus, any configuration of personnel, equipment, communications, facilities, and procedures must ensure the effectiveness and efficiency of information exchange.

2.2.3.2 Staff Relationships

As a basis for the CIC concept, there is a need to understand the foundation of staff relationships in reality versus the ideal. The ideal is one in which the relationship between the commander and his staff can be described as that of an interlocked mechanism, which exists for a single purpose upon which it expends all of its effort and resources.

Headquarters at all echelons aspire to this ideal. In reality, the typical staff is often fragmented, both organizationally and in assigned responsibilities. In addition, the creation of stovepipes in which the fragmented staff process is integrated vertically (e.g., a division special staff's interaction with corps and major subordinate commands [MSC]), may further exacerbate the fragmentation of staff processes. In combination, fragments and stovepipes have a cause-and-effect impact on staff operations that results in the need for excessive information hand-offs to provide the commander with the required support. Appendix A provides a detailed discussion of fragments, stovepipes, and hand-offs. In summary, however, it is excessive hand-offs that most negatively affect the commander's ability to control tempo and manage time.

2.2.3.3 Information Hand-offs

Information hand-offs are essential to operations and will always be necessary. They are a critical element in the ability of commanders to control operational tempo, to use time to their advantage, to have and share an RCP, and to have a leaner and more agile staff supporting their information needs. The expected increase in complexity and ambiguity of future operations will have an associated increase in the requirement for information hand-offs. The hand-off, as an information management actor, however, consumes the commander's resources to an ever greater degree. They create an expanded requirement for staff resources (people, layers, equipment, and supporting infrastructure) that is directly proportional to the requirement for hand-offs and **bears little or no relationship to the quantity or quality of the work the staff performs**. Therefore, staffs must organize and function in a manner that best reduces the impact of information hand-offs and their associated organizational and process fragments and stovepipes.

2.3 ASSUMPTIONS

In addition to addressing the commander's information management requirement, the CIC concept responds to the following assumptions:

- The proposed organization will be adaptable to the HQ of a heavy division, corps, and light division
- A division will never fight alone, without support and/or augmentation
- All operations will be joint and/or combined
- The proposed organization must support commanders with timely, accurate, and relevant information
- The proposed organization must support commanders with a balanced application of technology
- The proposed organization must ensure that the HQ at least maintains current levels of battlefield agility, versatility, and resource consumption.

2.4 THE CONCEPT

The CIC supports the information needs of the commander, the staff, and subordinate echelons. The CIC (figure 2-1) gathers, integrates, and synthesizes information and/or information products into a focused, division-level central database for the commander and the tactical operations centers (TOC). It synthesizes, maintains and, via the

information transport system (see paragraph 2.4.7), shares the RCP. The CIC collects and assesses information or information products in response to identified requirement and then distributes the resulting information products to the commander and staff. The CIC makes those products accessible throughout the commander's battlespace to subordinate and supporting forces, to higher and adjacent echelons, and, as required, to other organizations whose activities affect the commander's battlespace.

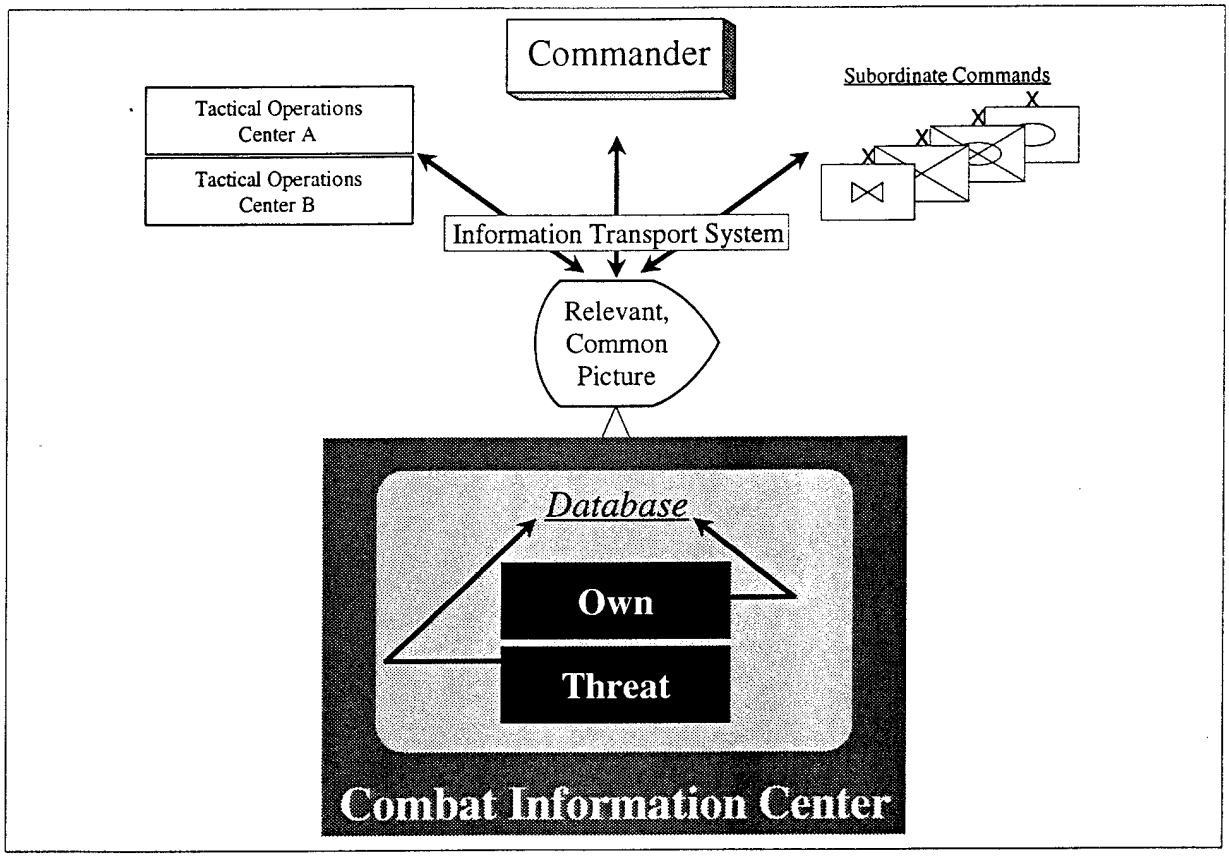

Figure 2-1. The Combat Information Center

2.4.1 Focus on Information Needs of the Command

The key CIC operating principle is to focus on the commander's and staff's information needs. The CIC uses the commander's critical information requirements (CCIR) and other established requirements to focus its gathering, processing, and filtering of

information. It focuses information searches to support current and projected requirements and processes information into an integrated, coherent product--the RCP (see paragraph 2.4.3). In addition to the RCP, the CIC fills specific requests for information not contained within the RCP that the commander and staff require. The CIC also protects the central database and proactively seeks to reduce the impact of information crises.

2.4.2 Commander's Critical Information Requirements (CCIR)

Automation has increased the capabilities of information collection and exchange systems, which has created a situation that can overwhelm commanders and staffs with information. Available information now almost always exceeds that required to support the current, future assigned, and anticipated missions. Automated information storage, analysis, and decision support capabilities increase the ability of commanders and their staffs to cope with this situation, but do not eliminate it. To deal with the overwhelming quantity of information available to them, commanders and staffs need an information filter. Such a filter allows the commander and staff to sort through this huge mass of information and pick out only the important elements of information they need.

FM 101-5, *Command and Control for Commanders and Staffs*, Final Draft, August 1993, defines this information filter as the CCIR. The CCIR are elements of information that "...directly affect the successful execution of...operations." In reality, CCIR are the commander's definition of "what's important"--they are unknown but needed bits of information critical to the commander's decision-making process. CCIR are:

- Defined by the commander
- Situationally dependent

- Specified by the commander for each separate operation
- Relevant to the commander who establishes them
- Guideposts to subordinate commander's development of their own CCIR
- Published in the OPLAN/OPORD.

2.4.3 Relevant Common Picture

TRADOC Pamphlet 525-5, *Force XXI Operations*, 1 August 1994, describes the RCP as follows:

> "Collective unit images will form a battlespace framework based on shared, real-time awareness of the arrangement of forces in the battlespace, versus a rigid framework of battlefield geometry--phase lines, objectives, and battle positions. This system permits commanders at every level to share a *relevant, common picture* of the battlefield scaled to their level of interest and tailored to their special needs."

Three RCP characteristics can be deduced from this description. First, it is based upon the parameters the commander establishes--these parameters include but are not limited to the CCIR. The RCP is developed in response to these parameters and is a method for displaying the information that satisfies them. Second, the RCP is situationally dependent. Although the RCP may have standard elements, regardless of the situation (e.g., friendly unit location and status), the overall RCP will vary with the mission and, probably, during the mission. The third characteristic of the RCP is that, like the CCIR, immediate subordinate commanders base their RCP on their higher commander's RCP, but with changes to elements of information that are relevant to them. Thus, the RCP is relevant to

a commander at a given level and common to that commander, the commander's staff, and the commander's immediate subordinates.

The primary benefit of the RCP is increased situational awareness. It provides commanders and staffs a shared picture of the battlespace situation upon which to base plans and execute operations. It also increases the commander's capability to integrate and synchronize the force. Further, the RCP enhances a force's ability to avoid fratricide.

2.4.4 Information Requirements

To perform its mission, the CIC must meet the following functional requirements:

- Continuously exchange information with the higher, lower, and adjacent forces and other organizations, as appropriate

- Comprehend that data is an inexhaustible resource. Left unconstrained and without focus data, cannot become information or knowledge

- Anticipate future information needs and initiate action to satisfy them, including providing input to the information collection plan and, as a result, ensuring continuity of operations

- Control the information tempo to support the battlefield tempo by acquiring and/or providing critical information.

2.4.5 Information Technology Impact

Emerging thought (TRADOC Pamphlet 525-5, *et al*) on the militarily significant implications of the information-age is that information technology will challenge the relevance of traditional organizational and management principles and that information technology will have a significant influence on military operations. In the doctrinal evolution that responds to technology advances, basic principles will remain while some methods may change to adapt to new concepts of operation. In this evolutionary process, the CIC concept is based upon the examination of alternatives and new ideas on how to best achieve decisively favorable results in war by shaping the battlefield of the future.

2.4.6 The Digitized Battlefield

The information-age, digitized battlefield extends from the highest echelon HQs forward to the lowest echelon platform. It affects the internal functions of HQs, as well as how they interface and exchange information with other HQs. Taking full advantage of the benefits of information technology and supporting automation and communications, commanders and their staffs will obtain significant advantages, including:

- An improved, common picture of the battlefield
- Enhanced situational awareness
- Increased integration across battlefield operating systems (BOS)
- Refined joint interoperability capabilities.

Doctrinally, implementation of the digitized battlefield will have far-reaching effects on the ways in which HQs conduct operations. The CIC is just one aspect of this change.

2.4.7 Information Transport System

The information transport system is a user-transparent information exchange support system that permits rapid, burden-free information exchange, without interruption, simultaneously using a variety of interoperable transport media. The system is an integrated set of interconnected automated gateways, fiber optic systems, radio systems, wireless local area network systems, cellular systems interfaced with satellite systems, and other technologies. It provides the CIC with a global plug-in and pull capability for required battlespace information at any time, from locations throughout the commander's digitized battlespace. Thus, the system provides the capability for the commander and the CIC to plug-in and acquire needed data and information from globally dispersed resources. The transport system is both tailorable and rapidly expandable. It relies upon extensive automation of source data and massively distributed database technologies to substantially diminish redundant, unneeded, and/or illogical user-level input.

SECTION 3
TACTICS, TECHNIQUES, AND PROCEDURES

3.1 GENERAL

> In modern battle, the sheer magnitude of available information challenges leaders at all levels. Ultimately, they must assimilate thousands of bits of information to visualize the battlefield as it actually is and then to direct the military efforts they head to make them what they must be to achieve victory. Thinking and acting are simultaneous activities for commanders in battle. The commander leads, conceptualizes, synchronizes, and makes timely key decisions; the staff acquires, synchronizes, and disseminates decisions and information.
>
> FM 71-100-2, *Infantry Division Operations Tactics, Techniques, and Procedures,* HQDA, 31 August 1993

This section establishes the tactics, techniques, and procedures (TTP) that a division commander can use when configuring and employing the CIC to help solve the information quandary described in FM 71-100-2. The CIC focuses on providing optimal, horizontally integrated information support to the commander. The CIC will leverage technology and achieve cross-BOS information integration to improve the commander' ability to make decisions and to enhance information exchange and processing. The positive results of employing the CIC will include significant performance improvements. The CIC is an important innovation. It offers the commander a significantly enhanced capability to manage information while substantially reducing the resource burdens traditionally associated with

information management. The level of benefit gained from CIC implementation will be directly proportional to the maturity of the information processes and systems supporting the CIC and the information skills of the staff officers and noncommissioned officers operating it.

3.2 CIC TTP OVERVIEW

The CIC develops, operates, and maintains the division HQ central database system to support the commander and all other elements of the HQ. It also supports the database systems of lower echelons and interfaces with those at higher echelons and adjacent forces. Via information collection management actions, the CIC anticipates and satisfies the information requirements that are described in the division information collection plan. Responding to information requirements that the commander and staff identify, the CIC acquires, integrates, and synthesizes information into a division-level database for their use. It gathers information to satisfy the CCIR, develops, maintains, and, via the information transport system, shares the RCP, and supports other information needs of the commander and staff. The CIC makes information accessible throughout the commander's battlespace to the CIC's equivalent in subordinate and supporting forces, higher echelons, and adjacent forces.

3.2.1 CIC Functions

The CIC's functions include:

- Establishing and maintaining the division HQ central database
- Inputting to CCIR development and solving CCIR

- Synthesizing and maintaining the division-level RCP
- Serving as the information gateway for augmentation elements required to support Army component (ARFOR) or joint task force (JTF) responsibilities assigned to the division.

3.2.2 CIC Tasks

Under direction of the division's chief of staff, the CIC conducts its assigned functions by accomplishing the following tasks related to each functional area:

- Function: Establish and maintain the division HQ central database:
  - Develop, operate, and maintain the force-level information management system
  - Project changes in information requirements, and acquire needed information
  - Identify information sources
  - Pull information vertically
  - Pull information laterally
  - Maintain the current situation, including the current enemy situation (status, capabilities, most likely/dangerous COA), in the central database
  - Maintain the airspace use and situation
  - Maintain accurate unit personnel status information in the central database
  - Maintain current estimate information
  - Maintain terrain information
  - Support the conduct of continuing intelligence preparation of the battlefield (IPB)

- Support lower echelon information requirements/systems:
- Reduce the impact of information crises by establishing, maintaining, and ensuring continuity of operations in the event of catastrophic loss
- Coordinate information protection actions with the signal battalion and coordinate counterintelligence support to protect the division HQ central database

- Function: Input to CCIR development and solve CCIR:
  - Satisfy intelligence requirements (IR), priority intelligence requirements (PIR), and friendly forces information requirements (FFIR)
  - Promulgate the essential elements of friendly information (EEFI)
  - Anticipate future information needs

- Function: Synthesize and maintain the division-level RCP:
  - In response to the commander's RCP parameters, synthesize the RCP
  - Provide the RCP to the commander and TOCs and share with other appropriate users
  - Monitor the current situation and update the RCP at commander-directed intervals

- Function: Serve as the information gateway to support Army forces (ARFOR) or joint task force (JTF) HQ responsibilities, as required:
  - Develop and maintain tactical standing operating procedures (TACSOP) for assumption of ARFOR or JTF responsibilities
  - Identify and incorporate ARFOR or JTF central database requirements
  - Collect, fuse, and assess ARFOR or JTF information
  - Process ARFOR or JTF information into the central database

- Incorporate and maintain ARFOR or JTF knowledge in the RCP in response to the commander's directives.

3.2.3 Flexible Design

To enable the CIC to optimize its capabilities in support of the division commander, the CIC concept incorporates a design that provides enhanced mobility and deployability. This design responds to three requirements. The first and primary requirement is the need to provide the commander with maximum flexibility to configure the CIC. For example, the CIC is organized in a manner that is readily divisible. This gives the commander the ability to combine and recombine the elements of the CIC, based upon the factors of mission, enemy, troops, terrain and weather, and time available (METT-T), while sustaining the full capabilities of the organizational whole. Also, it promotes the ability of the CIC members to engage in continuous operations while preserving their mental performance capabilities, which can degrade rapidly under battlefield conditions. Those mental capabilities will become increasingly important with the proliferation of information support and other automated tools that a unit needs to effectively utilize the expanding amounts of data and/or information.

The second requirement is to use technology as the enabler of both flexibility and redesigned processes, while, simultaneously, using technology to reduce the overall resource consumption of the HQ. The design assumes the use of technologically enhanced capabilities that the Army forecasts to be feasible by the year 2000 or before.

The third requirement is to remove, as much as possible, the real or artificially imposed physical, mental, and organizational barriers to intrastaff communications and understanding. This requirement focuses upon creating an internetted staff organization that assists the commander with horizontal integration of information in the force and with

optimum information exchange. The CIC achieves this requirement by establishing the division's central database--ensuring that the staff and subordinates can all be on the "same sheet of music"--and by promulgating the RCP, which gives the staff and immediate subordinate commanders a situational awareness common with that of the commander.

Figure 3-1 represents one interpretation of how a division commander may configure a CIC. **The figure is illustrative only and must not be viewed as dictating the solution to many, most, or all conditions that the commander may face**. A single "best"

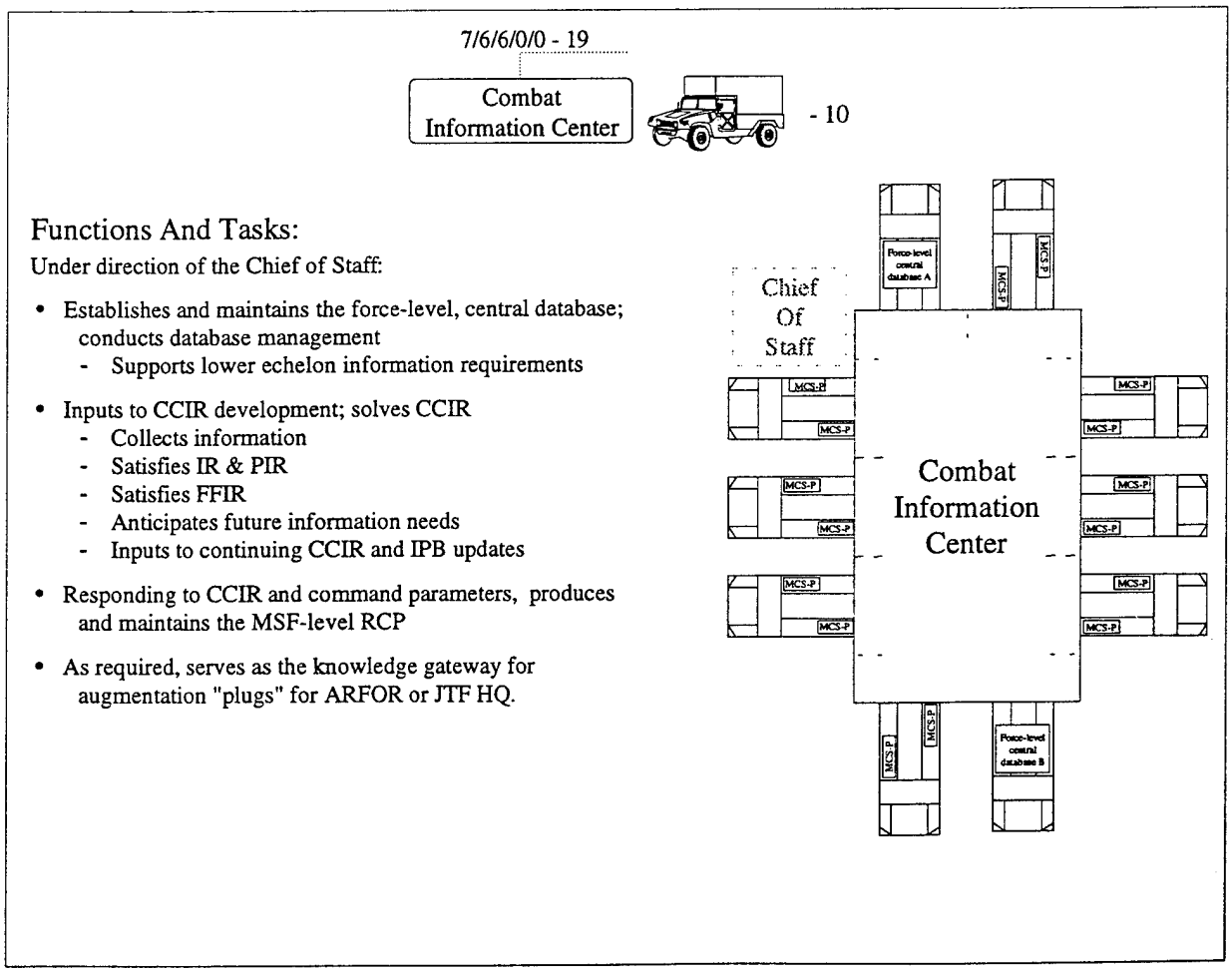

Figure 3-1. The Combat Information Center

CIC configuration solution, fitting a variety of conditions, does not exist. The CIC is compatible with initiatives that individual division commanders may use to organize and

operate their HQs. Tailoring the CIC to the most suitable configuration to support their operational requirements remains the prerogative of the commander. The CIC provides the capability to adapt to each commander's and each situation's requirements.

3.2.3.1 CIC Personnel

The CIC's personnel complement includes the officers and senior NCOs required to establish and maintain the central database. In figure 3-1, the order of listing of personnel requirements is officer / warrant officer / interchangeable--field grade officer or senior NCO / NCO / other enlisted - total (i.e., 7/6/6/0/0 - 19). The CIC is staffed with enough personnel to accommodate three duty rotations during normal operations (see paragraph 3.2.3.3).

The CIC concept envisions the following three standards for officers and NCOs assigned to the CIC. First, such assignments should be competitive. Individuals should not be assigned to the CIC until they have demonstrated a defined set of skills and proven their proficiency at established levels. The key element in the qualifications for CIC assignments is the possession of abilities and skills to perform distributed database and information resource management. Actual assignments to a CIC would be by order of merit, based upon demonstrated competencies. Second, officers competing for such assignments should be graduates of the command and general staff officer's course. Third, NCOs should hold the rank of sergeant first class and be a graduate of both their advanced NCO course and the battle staff NCO course.

Experienced personnel are critical to the efficiency and effectiveness of the CIC in supporting the commander in the varied situations identified for the force-projection Army. Employment of field grade officers or senior NCOs interchangeably in the CIC underscores the need for highly qualified personnel who not only are proficient in performing their

primary duties, but who also understand the interrelationships of their function with others in the HQ and the division. The central database and the information exchange that supports it must focus the actions of the assigned personnel and they must be able to fully utilize the technology leverage available to the CIC. Under all operational circumstances, they must be responsive to the requirements of the commander--providing him with the means to exercise battle command.

3.2.3.2 CIC Equipment

The CIC is equipped with sufficient automation and communication assets to enable it to support the information needs of the commander and the TOCs. Conceptually, the CIC equipment assets include the Maneuver Control System-Phoenix (MCS-P) and two duplicate main computers to operate the central database. (MCS-P devices will replace the two main computers during exercise Prairie Warrior 1996 [PW96]). The main computers enable the CIC to engage in distributed information management by providing a central repository (often referred to as an information warehouse) for the information that satisfies the commander's previously identified information requirements. One main computer is the primary system for the central database and the other (which is a duplicate of the primary) either is a backup or is the information resource for division HQ assets remaining in sanctuary during split-based operations. The central database computers enable the creation of a virtual database developed via high-speed connectivity to the division's distributed information sources.

For mobility, the CIC uses the HMMWV with rigid wall shelter. The CIC has sufficient lift capability to move itself in one "jump." Signal battalion assets support the CIC in maintaining the connectivity required to exchange information with all other elements of the HQ, with subordinates, and any other information source needed. The connectivities result in the CIC creating a single virtual, logical database covering all required information.

3.2.3.3 Continuous Operations

Force XXI combat operations are fast-paced, around-the-clock, and intense. These conditions will challenge both individual staff members and the HQ as a whole to keep going and accomplish their missions over long periods of time. However, mental abilities and critical staff performance rapidly degrades if there is no opportunity for the staff to stand down or for staff members to sleep more than a few minutes. Determining to endure does not ensure effectiveness; combat simply exhausts the staff. Lack of sleep reduces their ability to perform tasks as quickly or effectively as necessary. When normal sleeping habits or routines are upset for more than 36 to 48 hours, the staff will feel the effects of fatigue and stress from combat more intensely. This will dramatically interfere with staff functions that require intensive mental processes and that are critical to the commander's effective exercise of battle command.

Thus, a major consideration in the CIC design is provision of a real and acceptable capability for continuous operations. The CIC does not engage in traditional "shift changes." Shift changes increase both the requirements for handoffs and the loss of information. The CIC process and organizational design can dramatically reduce this information loss. Members of the CIC change work periods on an individual basis designed to promote continuous operations over extended periods. Recommended staffing levels account for three people per position; this allows for three duty rotations per day.

3.3 INFORMATION MANAGEMENT

The key to the experienced and intuitive commander's effective exercise of battle command is information management. All information that the division's and/or the HQ's automated and manual information systems generate has one overriding purpose--to

help the commander formulate information requirements and then make timely decisions during the chaos, turmoil, and confusion of battle.

3.3.1 Information Focus

Keeping the purpose of information in mind, commanders and their supporting CICs will use an information management system that is as sophisticated as the weapon systems the force employs. The CIC will leverage technology by employing a system that provides the needed information as a product. The CIC focuses upon assisting the commander in the process of sifting through the mountains of data that the information system can provide.

3.3.2 Information Flow

Information will flow into and out of the CIC both vertically and horizontally. The flow will be push and pull in both planes. Emphasis, however, will be on the pull flow that is driven by the commander's information requirements. In most cases, data will be pulled into the CIC and fused into information. The CIC may keep information, expand upon it, or modify and distribute it within the HQ, or push it in another direction.

3.3.3 Information Sources

Under the force-projection strategy, information sources potentially become many and varied because of the wide range of missions assignable to a division with a CIC (see figure 3-2). Information sources can provide raw data and processed data, but most will be information that has been developed into information products. As an operation is planned or progresses, the sources the CIC uses will continue to evolve to satisfy the

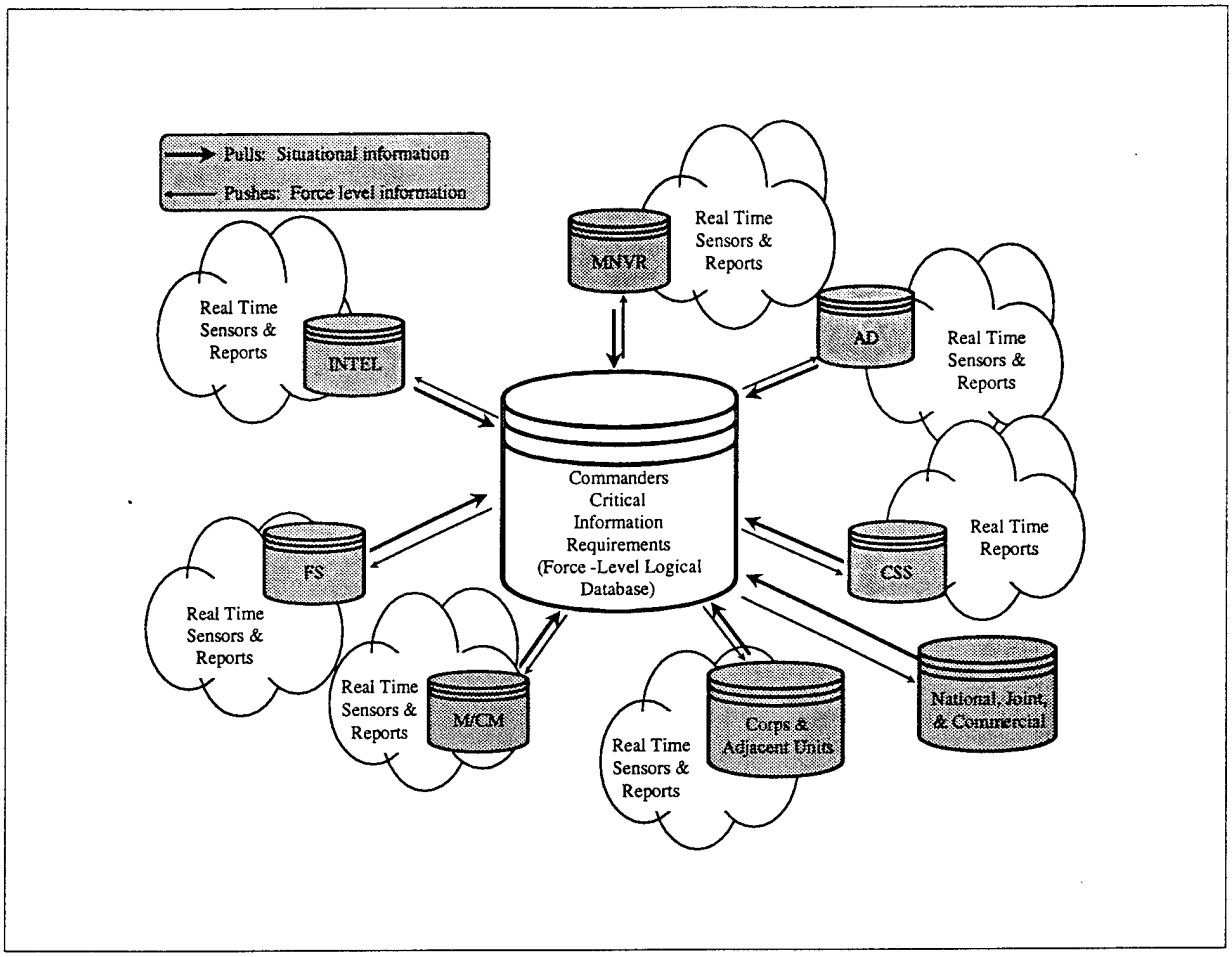

Figure 3-2. Information Sources

commander's information needs. The CIC will use the BOS databases as a primary source of information. Additionally, the CIC will obtain information from higher echelon data sources, including national, joint, and commercial sources. The information flow process, discussed above, emphasizes pulling information into the CIC in response to defined or anticipated requirements. This will reduce the overall resource requirements of the HQ information architecture and will free architectures outside the HQ to focus upon expedited information exchange, such as direct sensor to shooter.

The Army Tactical Command And Control System (ATCCS), a major component of the Army Battle Command System (ABCS), assists the information process

by connecting database repositories of combat information and processed information pertaining to each vertically integrated BOS. The current components of the evolving ATCCS include the MCS-P, the Advanced Field Artillery Tactical Data System (AFATDS), the All-source Analysis System (ASAS), the Forward Area Air Defense Command, Control, Communications, and Intelligence (FAADC3I) system, and the Combat Service Support Control System (CSSCS). The objective ATCCS (which may include current components and other components in addition to, or in place of, today's) provides an efficient and rapid means of retrieving information, enabling the CIC to develop and maintain a single, virtual (or logical) database for the HQ that satisfies both current and anticipated information needs. This allows the commander and the staff to continue routinely coordinating, integrating, and synchronizing current and future operations.

3.3.4 The Objective Architecture

The information architecture in which the CIC participates ties together the envisioned information process with flow requirements, commander-directed and -focused requirements, and changing source requirements. Figure 3-3 depicts this architecture and relates it in terms of the CIC concept. The depicted architecture permits integration of real-time situation information with sensor and other data into the division-level central database. Access to this central database is distributed, via a query-based routing system, throughout the commander's battlespace, giving the commander and staff access to the information they need. Thus, the commander has the capability to satisfy and, as required, to modify the full range of his information needs from a location that is not physically tied to the CIC.

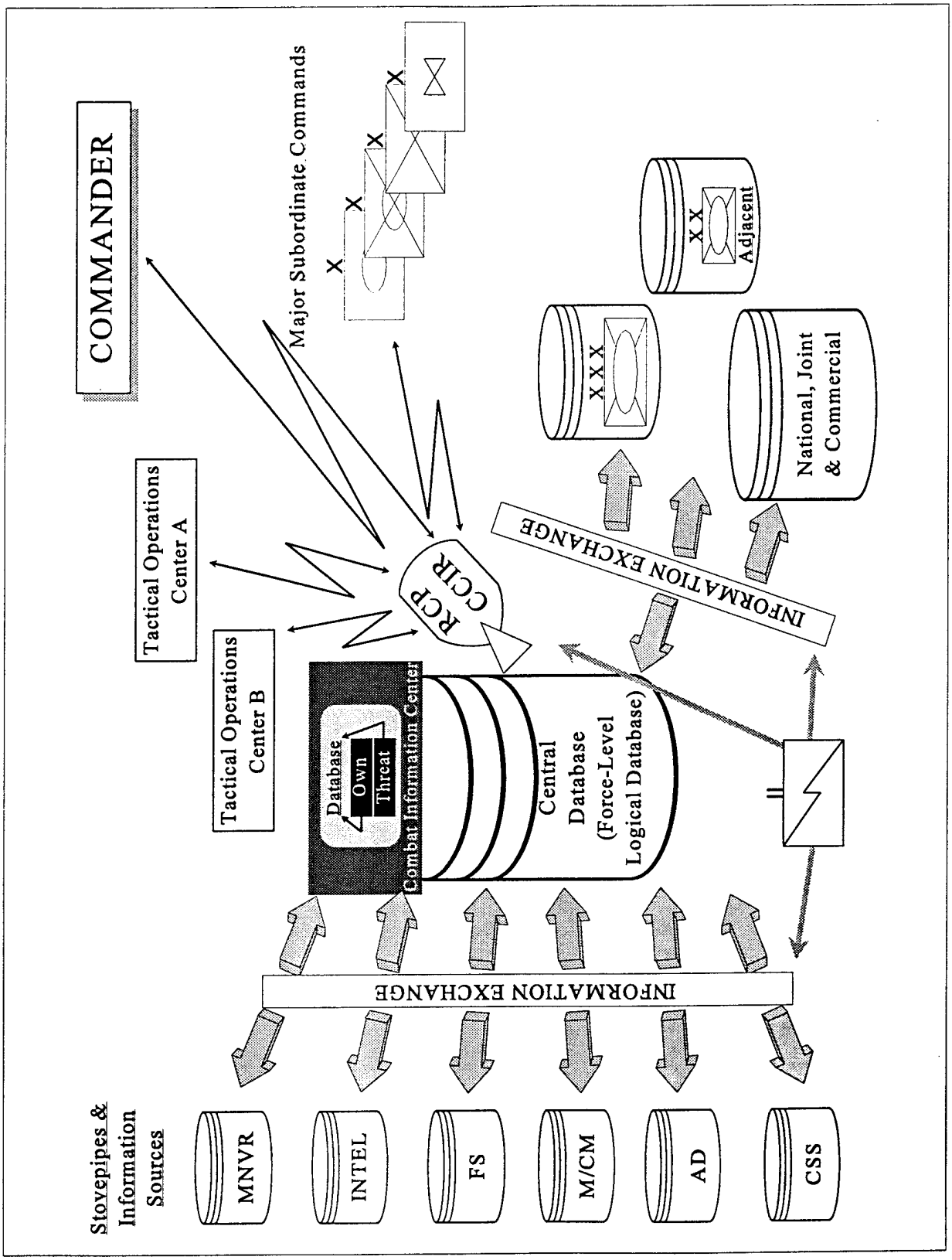

Figure 3-3. The Objective Architecture

3.3.5 The Information Process

All information that the CIC generates is predicated upon, and driven by, the commander's and staff's information needs. These needs include the CCIR and the RCP. The commander, not the staff, personally establishes CCIR and RCP parameters because they are based upon the commander's continuously evolving vision of operations (current and future) and the commander's continuing, independent estimate of the situation. The CIC provides input to the commander's development of CCIR, develops the RCP in response to the parameters the commander identifies, and decides upon the relevancy of specific information, based upon its utility in satisfying CCIR and other information requirements.

TOC B, in response to the CCIR and other information requirements, develops an information collection plan (including an information synchronization matrix) to satisfy these requirements. The information collection plan is similar to the intelligence collection plan, except that it includes all information requirements, not just intelligence. The CIC provides input to the information collection plan. Based upon the information collection plan and the CIC's input, the TOCs generate specific taskings for information from the MSCs, sensors, and other information sources to satisfy the requirements. As information is acquired, the sources either send it to the CIC or put it in their BOS database. The CIC may pull information from the BOS databases of the MSCs. ***Routine or standard reports to the CIC are the exception*** that the staff establishes for a few cases such as the unlikely event of a PIR remaining stable through a series of operations. In some cases, the information the CIC seeks will not be present at the identified source. In response, the CIC will either identify and seek the information from an alternate source or it will request that TOC A task and/or coordinate with the appropriate unit for acquisition of the information. The CIC also has the capability to place electronic "alarms" at appropriate spots in information systems to

alert it to a critical, specific item of information. In summary, the CIC is responsible to the commander for developing and operating a cross-BOS and other information source system of holistic collection management.

In response to information requirements, the information system focuses on getting the right information to the commander or decision-maker as quickly as possible. If a piece of information itself does not directly contribute, or support development of information that contributes, to a current or anticipated decision, that information may be "nice to have" and the CIC will not waste effort on gaining or generating it. Further, the CIC normally does not provide raw or unanalyzed data to the commander. Typically, the CIC receives an information product that is the result of some analysis. The CIC processes most information into a further refined product that enables the commander and staff to grasp quickly the meaning of the information and to assess its impact. Thus, the CIC's bottom line is that information that does not directly answer, or support the answer to, the commander's and the staff's requirements and that cannot be seen and then readily used is not effective, regardless of how great the efforts expended to produce it may be.

3.3.6 CIC Relationship with the TOCs

Except when directly monitoring the communications of committed and supporting units, the TOCs do not engage in the pursuit of information. They get the information they need from the satisfied CCIR and the RCP that the CIC provides. Because of the centralized database, current operations information is identical at both TOCs. The TOCs identify their additional information requirements not found in the satisfied CCIR or the RCP to the CIC. The CIC proactively engages, with the TOCs, in the identification and development of information requirements. Therefore, the CIC has probably already satisfied most requirements before the TOCs request them. To satisfy information requirements, the

CIC routinely identifies the source(s) and uses its automated information search and retrieval processes to ensure quick availability of required information. As the current operation evolves (and the commander evolves the CCIR and RCP parameters with it), the CIC seeks and gains the information needed to satisfy the evolving information requirements. Thus, while the TOCs are the users of information, they rely upon the CIC to proactively and aggressively seek information from, and/or receive input from, all organizations that are committed to the current operation, are supporting the current operation, or whose activities affect the current operation.

3.3.6.1 TOC A

TOC A requires expedited access to the RCP and the HQ central database to support timely decisions concerning the current operation. TOC A tracks and analyzes event information that it gains from the RCP that the CIC provides or, by exception, that it receives from committed units. This information focuses on combat events and capabilities two levels down. The information that TOC A presents to the commander is an analysis of the significant current events and status--compared to planned events and status--and recommended adjustments (if any). This analysis is keyed to the decision-support template and synchronization matrix (and associated supporting event trees) that TOC B developed and adjusted during the process of planning what is now the current operation. TOC A also queries the central database or tasks the CIC for specific requirements in anticipation of, or in response to, questions from the commander. Further, the CIC inputs to TOC A's work in assisting the commander with updating CCIR as the current operation progresses and changes.

3.3.6.2 TOC B

The CIC provides TOC B with the information it needs for planning future operations. This includes the RCP and information products necessary for IPB. TOC B develops the information collection plan as part of the OPORD/OPLAN. TOC B is also a major source of personnel and logistics information for the CIC. Further, the CIC inputs to TOC B's work in assisting the commander with updating CCIR for future operations.

3.4 COMMANDER'S CRITICAL INFORMATION REQUIREMENTS

Within the context of each current and future operation, commanders face the continuous challenge of having to prioritize and tailor their information requirements. The potential amount of information available can be overwhelming. Regardless of the total amount of information available, commanders must know the intent of their higher commanders (two echelons up), their assigned or anticipated missions, the locations of their forces, the current activities of their forces, and the current capabilities of their forces. Commanders need to know almost the same information about the enemy, and they also need to know how the enemy views their force. The amount of information potentially available to meet the commander's needs dictates a requirement to preclude a technical or cognitive information overload by providing information management tools to assist the commander. The CCIR are those tools. The commander's development and selection of CCIR leads to staff derivation of IR, PIR, EEFI, and FFIR. These are information management tools for tailoring requirements, synthesizing the RCP for the commander, enabling the commander to visualize the current and future state of friendly and enemy forces, and, based on the visualization, formulating a concept of operation to accomplish the assigned mission.

3.4.1 CCIR Purpose

The purpose of the CCIR is to focus the staff's information gathering while precluding unnecessary work or duplication of effort. CCIR are unknown items of information that are of such critical importance to the decision-making process (and the subsequent operation) that their availability (or lack thereof) will directly affect the outcome of an operation. CCIR allow the commander to define information needs and, in turn, focus the staff (and subordinate commanders) on information acquisition, fusion, and analysis. As stated in paragraph 2.4.2, above, CCIR can be further described as being:

- Dependent upon the situation
- Specified by the commander for each operation or, based upon the staff's understanding of the commander's intent, recognized by the staff as an implicit requirement
- Generally time-sensitive with decision points on a decision support template or event requirements of the synchronization matrix driving their collection
- Specific to each commander. Each commander establishes his or her own CCIR, but must consider and, as appropriate, respond to the CCIR of the next higher commander
- Normally published in the applicable operations plan/order and transmitted via specified means

- A link between current and future operations.

3.4.2 CCIR Derivatives

CCIR enable the TOCs to derive PIR (how the commander sees the enemy), which enable the staff to determine what the commander needs to know about the enemy. The TOCs also derive FFIR (how the commander views the commander's force) which enable the CIC to develop information for the commander to make decisions at critical points and times based on a determination of the combat capabilities of the commander's force. Further, from the CCIR, the TOCs develop EEFI (how the commander views the friendly force from the enemy commander's perspective), which allow the commander to discern what information would be essential to the enemy for that enemy to defeat the commander's force. EEFI are essential to a strong operations security (OPSEC) program and form the basis of the CIC's ability to protect the central database. The CIC also generates information queries in response to the TOCs' use of CCIR to develop IR. Current doctrine defines IR as "Intelligence gaps that must be filled in order to reduce the uncertainties associated with the successful execution of a specific friendly course of action (COA). Each is linked to a specific enemy action that requires a friendly response. Each must be situationally templated and wargamed. Wargaming will dictate which IRs become PIRs as the operation runs its course." (extract from FM 34-8, *Combat Commander's Handbook On Intelligence*)

3.4.3 CIC and CCIR

The CIC does not directly participate in development of CCIR. Further, the TOCs provide only input and assistance to the commander, who develops the CCIR. However, because of its information management expertise, the CIC can provide major input to the TOCs when the TOCs develop the information collection plan to satisfy the CCIR.

When developing CCIR, commanders must be careful not to be too specific because this will diminish the CIC's chances of obtaining the right information. There are many possible CCIR questions from which to choose. FM 101-5 provides an excellent discussion of them. The CIC maintains a master CCIR list in the central database and updates it in accordance with the commander's guidance.

3.5 RELEVANT COMMON PICTURE

The CIC collates and fuses information and information products relating to the current status and actions of the division and the enemy. The CIC also monitors the entire battlespace in its six dimensions (time, purpose, resources, and the three dimensions of space). It then produces a single, synthesized picture of friendly and enemy forces, and the battlespace environment that it provides to the commander, to other elements of the HQ, to subordinate forces, to adjacent organizations, and to the central database of the next higher headquarters (see figure 3-4). This picture is called the relevant common picture (RCP), and is based upon parameters the commander selects. The RCP ensures the commander and the entire HQ (in particular, both TOCs) have access to the same information, thereby providing situational awareness to support their ability to make decisions about current operations or future plans. The picture is relevant to the commander at a given level and common to the commander, the commander's staff, and the commander's immediate subordinates.

3.5.1 RCP Production

The CIC produces the RCP by gathering information and synthesizing it into the most accurate picture possible of the satisfied CCIR and RCP parameters that the commander establishes (see figure 3-5). Although they may vary from operation to operation, the RCP parameters typically include:

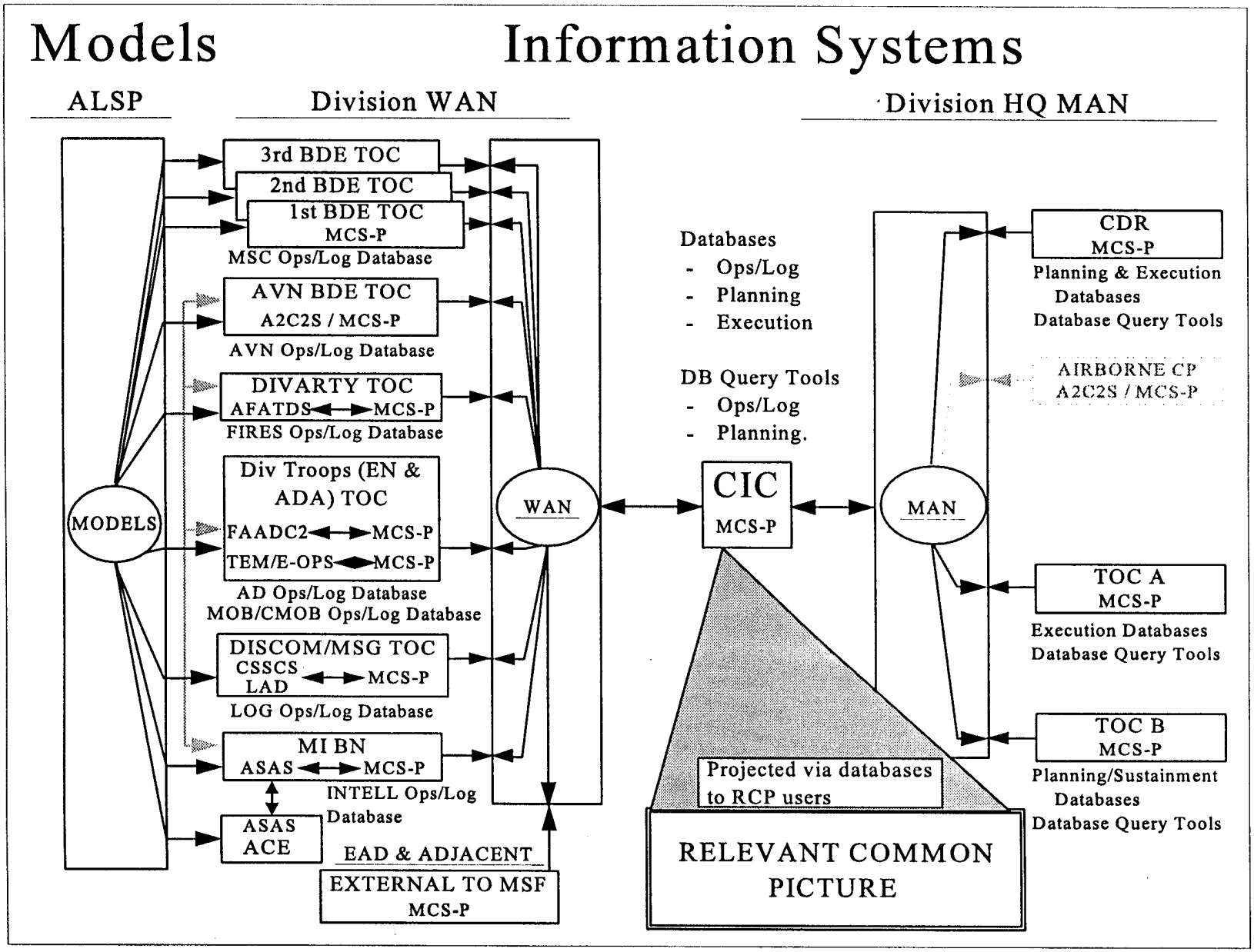

Figure 3-4. RCP Development

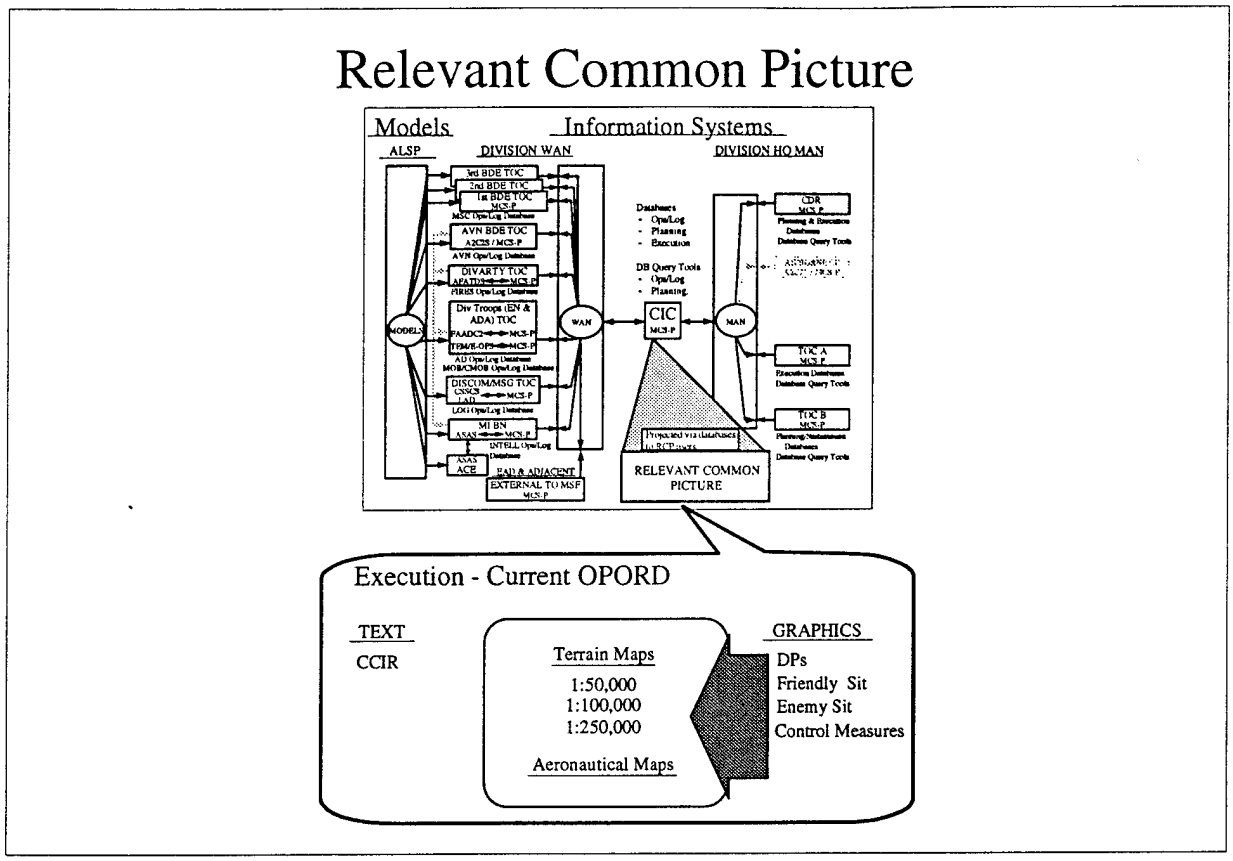

Figure 3-5. RCP Parameters

- Friendly situation: unit locations and status including brigade-level CPs, division reserves, division CPs, major supporting units, and adjacent units. Typically, for the commander's force, the RCP shows unit locations and status two echelons down, but the commander may routinely request location and status of smaller units, such as special operations forces

- Enemy situation: unit locations and status (confirmed and suspected), enemy boundaries (confirmed and suspected), and the latest intelligence summary. As with the friendly situation, typically the RCP shows the enemy situation the equivalent of two echelons down, but the commander may routinely request location and status of smaller units, such as special operations forces

- Control measures, including current maneuver control, fire support coordination, and air space coordination measures

- Decision points

- Satisfied CCIR.

3.5.2 RCP Objective

Regardless of the specific RCP parameters, the objective is to provide the commander and staff with the details of the force's battlespace necessary for both to anticipate operational events, and compare those events against the plan, for the staff to recommend changes, and for the commander to direct change when change is required. In essence, the RCP serves as the eyes of the staff and commander for analysis of all information affecting current deep, close, and rear operations. It must, as a minimum, enable the staff to answer the following commander's questions:

- What is the adversary doing now?
- Where is the adversary vulnerable?
- What are the adversary's key decisions and how do we want to influence those decisions?
- What are the flank situations?
- What combat power do we have now?
- What are our vulnerabilities now?

3.5.3 RCP Methodology

Using the information synchronization matrix as the basis, the CIC gathers the information or information products that will satisfy the RCP parameters from the BOS databases at the MSCs and from other sources. The CIC then synthesizes this information into a single package consisting of, as required, either a single or a set of databases. This package is the division RCP. Depending on the technical methodology used, either the RCP package may contain the routines and subroutines that govern display of the RCP or the CIC will develop separate software programs for RCP display. Once the CIC has developed an operation's initial RCP, the CIC distributes it and updates it at an interval the commander determines. (Note: it is recommended that within the division HQ, only the CIC use the *autoplot* function of MCS-P. This will maximize the information exchange capabilities of the system.)

3.6 INFORMATION ACTIONS

Below is a summary of the actions the TOCs and CIC take to satisfy the information needs of the commander and remainder of the staff.

- TOCs assist the commander with developing, updating, and maintaining the CCIR and RCP parameters. The CIC may input to this process.

- The CIC inputs to the information collection plan (including an information synchronization matrix) that TOC B develops in response to the CCIR, RCP parameters, and other information requirements identified by the staff and subordinates.

- As appropriate, the CIC requests that the TOCs task units/systems to collect information in accordance with the information collection plan.

- The CIC gathers information to satisfy the CCIR, to synthesize the RCP, and to meet any other identified information requirements.

- The CIC distributes information and information products that satisfy the CCIR and any other identified information requirements to the commander and staff. The CIC makes the satisfied CCIR accessible to others as appropriate.

- The CIC synthesizes the RCP (including satisfied CCIR).

- The CIC distributes the RCP to the commander, the remainder of the staff, and to immediate subordinate commanders. The CIC makes the satisfied RCP accessible to others as appropriate.

- The CIC continues to gather information based on updated CCIR, RCP parameters, and any additional information requirements.

- The CIC updates the RCP at time intervals the commander sets as part of the RCP parameters.

3.7 EXERCISE PW96 INFORMATION TRANSPORT SYSTEM

This section illustrates the communications architecture for the MSF HQ in PW96. The diagrams illustrate how the data and voice communications systems should link

for processing of the information that the Corps Battle Simulation (CBS) and the MSF generate during PW96 and the preceding simulation exercises (SIMEXs). There are separate diagrams that represent a data net, a voice command net, a voice operations/intelligence net, and a voice administrative/logistics net. An explanation accompanies each diagram.

3.7.1 Data Net

The data net (see figure 3-6) is the backbone of the HQ information-processing system. It is the means by which the MSF HQ, in particular the CIC, passes the data that the

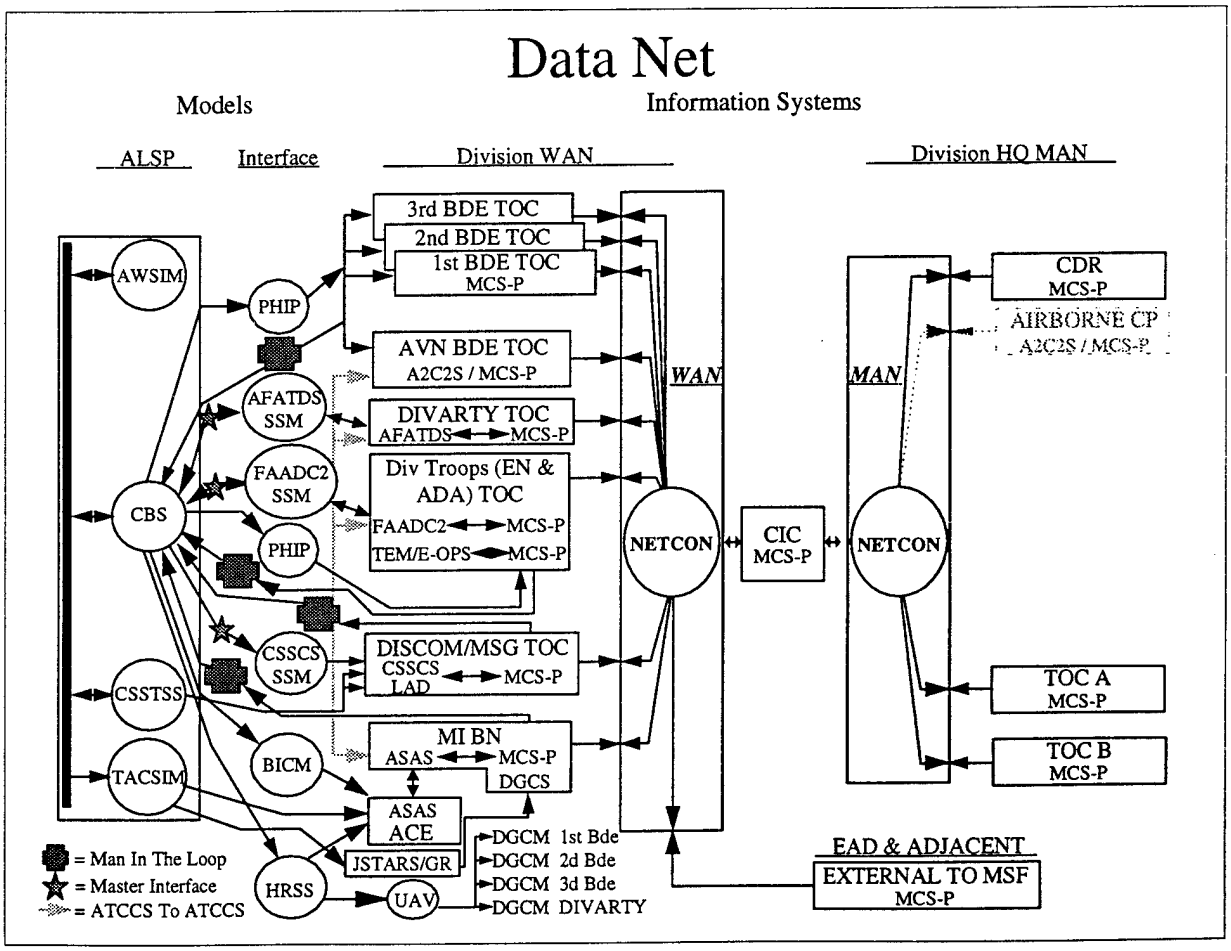

Figure 3-6. The Prairie Warrior 96 Data Net

information warehouses (BOS databases and the central database) will store and make available to all users who have access to the network.

3.7.1.1 Warfighter Models/Simulations

The left column of the diagram illustrates the models/simulations selected from the 1995 Confederation of Models for use in PW96. With the exception of TACSIM, the Aggregate Level Simulation Protocol (ALSP) will link these models for two-way communication. TACSIM will receive information from the other models via ALSP but will not send information back to the other models in the confederation. CBS will be the primary driver for the simulations, communicating with the appropriate ATCCS functional area system through applicable interfaces. Combat Service Support Training Support Simulation (CSSTSS) will provide additional logistics information to CSSCS, the ATCCS for the combat service support BOS, and to the Logistics Anchor Desk (LAD). TACSIM will provide additional intelligence information to ASAS, the ATCCS for the intelligence BOS.

3.7.1.2 Interfaces

Communications between the CBS model and ATCCS cannot be accomplished without an appropriate interface. In some cases, a single-interface special simulation model (SSM) accomplishes the requirement for two-way communications--such as with the FAADC3I SSM and the AFATDS SSM. Communications between CBS and MCS-P requires two interfaces--the Phoenix Interface Processor (PHIP) to pass information from CBS to MCS-P and a man-in-the-loop (MITL) to pass information back to CBS via the keyboard at a CBS terminal. Since CBS is the source of intelligence information, a requirement does not exist for passing intelligence information back to CBS. Therefore, only a one-way interface is required for intelligence information. That interface is BICM. A

separate interface, HRSS, is required for operation of the unmanned aerial vehicles (UAVs). However, to provide information back to CBS regarding movements of intelligence resources (e.g., units and sensors) requires a MITL.

3.7.1.3. Command, Control, Communications, Computer and Intelligence (C4I) Systems

ATCCS Systems. With one exception, the currently fielded/planned ATCCS will be used outside of the CIC. The exception is that during the PW96 experiment and preceding SIMEXs, the MCS-P will replace the currently fielded version of MCS. The light-shaded arrows to the left of, and connecting, selected elements of the division troops shows existing capabilities and/or requirements for information exchange among ATCCS systems (e.g., direct sensor to shooter).

MCS-P. MCS-P will be the common data system that elements of the HQ use to support the exchange of information with the HQ and to display the RCP. MCS-P is the system that the MSF uses for its command and control (C2) BOS.

3.7.1.4 Forces

Division Troops. Until the hardware/software for the C2 BOS can be integrated with the hardware/software of the other BOSs, division units have a requirement to operate with the ATCCS functional area system for their own appropriate BOS and with MCS-P for the MSF C2 BOS. They must use their BOS ATCCS to communicate with CBS through the interfaces described above and their MCS-P to communicate with the MSF's HQ via the MSF wide-area network (WAN). Exceptions to this are in the maneuver brigades where MCS-P replaces MCS as the ATCCS for the maneuver BOS and in the engineer

brigade where an ATCCS does not exist for the mobility/counter-mobility/survivability (M/CM) BOS. The engineer brigade will use MCS-P as its means of communicating with both CBS and the HQ. The engineer brigade will have a system available to help with its M/CM mission requirements--the Terrain Evaluation Model/Engineer-Obstacle Planning System (TEM/E-OPS)--it does not fall into the category of the ATCCS, however.

Division Staff. The CIC is the focal point of the information flow between the division troops and the remainder of the MSF staff. The CIC will receive information from, and pass information to, division units via the MSF WAN. It will receive information from, and pass information to, the rest of the HQ via the MSF metropolitan area network (MAN). The MAN will connect the remainder of the HQ to the CIC. During operations, redundant WAN and MAN capabilities must exist, but during PW96 and the SIMEXs, this requirement will not be met.

Echelons Above Division (EAD) and Adjacent Units. External organizations should be equipped with an MCS-P to communicate with the MSF. The MCS-P at those organizations should link with the MSF via the WAN.

3.7.1.5 Man-In-The-Loop/Surrogates

Surrogates must be available to fill the potential information voids between the separate databases that the ATCCS systems and MCS-P maintain and between the separate databases that the CBS and the ATCCS maintain. Generally, the role of the surrogates will be to analyze and distribute data between the experimental systems and legacy systems. In most cases, subject-matter experts (SME) will perform the surrogate functions. However, PW96 experimentation cannot rely solely upon use of subject-matter expertise as a database surrogate. Coupling the current database capabilities of the MCS-P with the SMEs will

provide the beginnings of an adequate surrogate, however, and will support the automated information exchange around which the CIC concept is built.

3.7.1.6 Local Area Network (LAN)

The staff elements will have local area networks (LAN) to transmit data (and voice, as appropriate) within defined area locations. The LANs will provide sufficient bandwidth for both voice and data. The LANs may be used, selectively and with constant monitoring of bandwidth use, for video.

3.7.1.7 Metropolitan Area Network (MAN)

A MAN will connect the LANs of the various staff elements. The MAN is intended to act as a digital backbone throughout the HQ. MANs integrate voice, data, and video service at high data rates.

3.7.1.8 Wide Area Network (WAN)

A WAN, usually the division area common user system (ACUS), such as mobile subscriber equipment (MSE), will connect the HQ MAN with the Defense Information Infrastructure (DII) to create virtual linkage with databases external to the HQ. The DII will establish a global grid capability to support military operations. Also, the signal battalion will operate satellite terminals to support the commander's requirement for dedicated, noncompetitive connectivity to DII entry locations. Thus, the architecture provides the division commander with organic communications assets to implement split-basing operations between the operational area, and a sanctuary location, and to establish an assured communications link between the commander and staff.

3.7.2 Voice Command Net

The voice command net is the warfighter net. This net is the MSF commander's primary means of voice communication and is the MSF's primary means of ensuring immediate transmission of warnings (e.g., inbound threat aircraft). Figure 3-7 depicts the voice command net with the net control station (NCS) at TOC A. During exercise

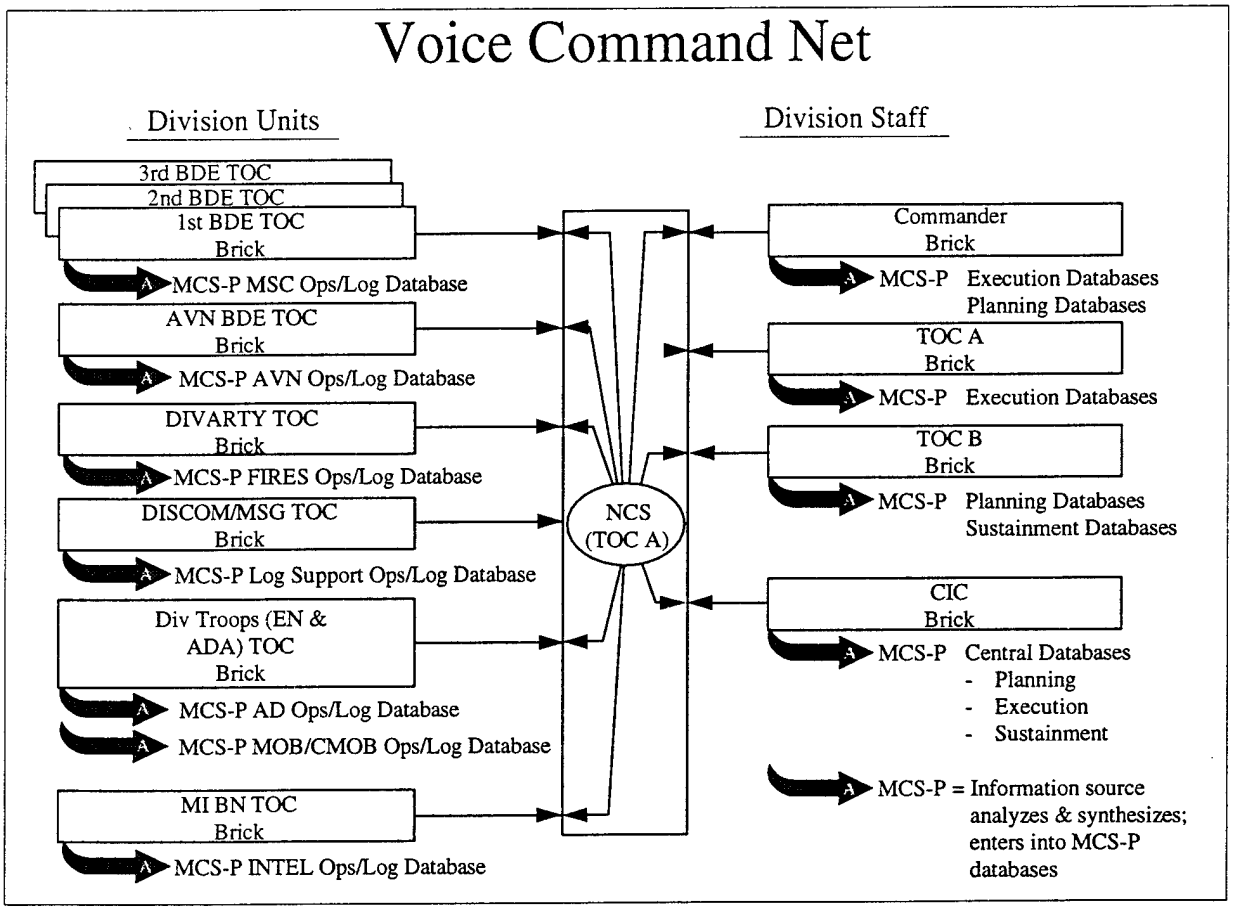

Figure 3-7. The Prairie Warrior 96 Command Net

Prairie Warrior 1995 (PW95), the voice command net used MCS-P as the communications system. However, this was not ideal since it tied up bandwidth that could have been used for other, more suitable purposes (e.g., operational information exchange). The currently available hand-held transceivers (bricks) will suffice as a surrogate for this net during PW96.

The bricks offer a stand-alone, dedicated system for MSF C^2 and allow commanders mobility for the exercise. The users of this net, however, must ensure that information they originate on the net is entered into the appropriate database for record purposes. In the case of warnings, some source data entry and transmission will occur automatically (e.g., air strike warnings on FAADC3I), but most source data entry will not be automatic.

3.7.3 Voice Operations/Intelligence Net

Figure 3-8 depicts the voice operations/intelligence net. Evaluation of the three SIMEXs preceding PW95 noted the absence of a voice operations/intelligence net. For

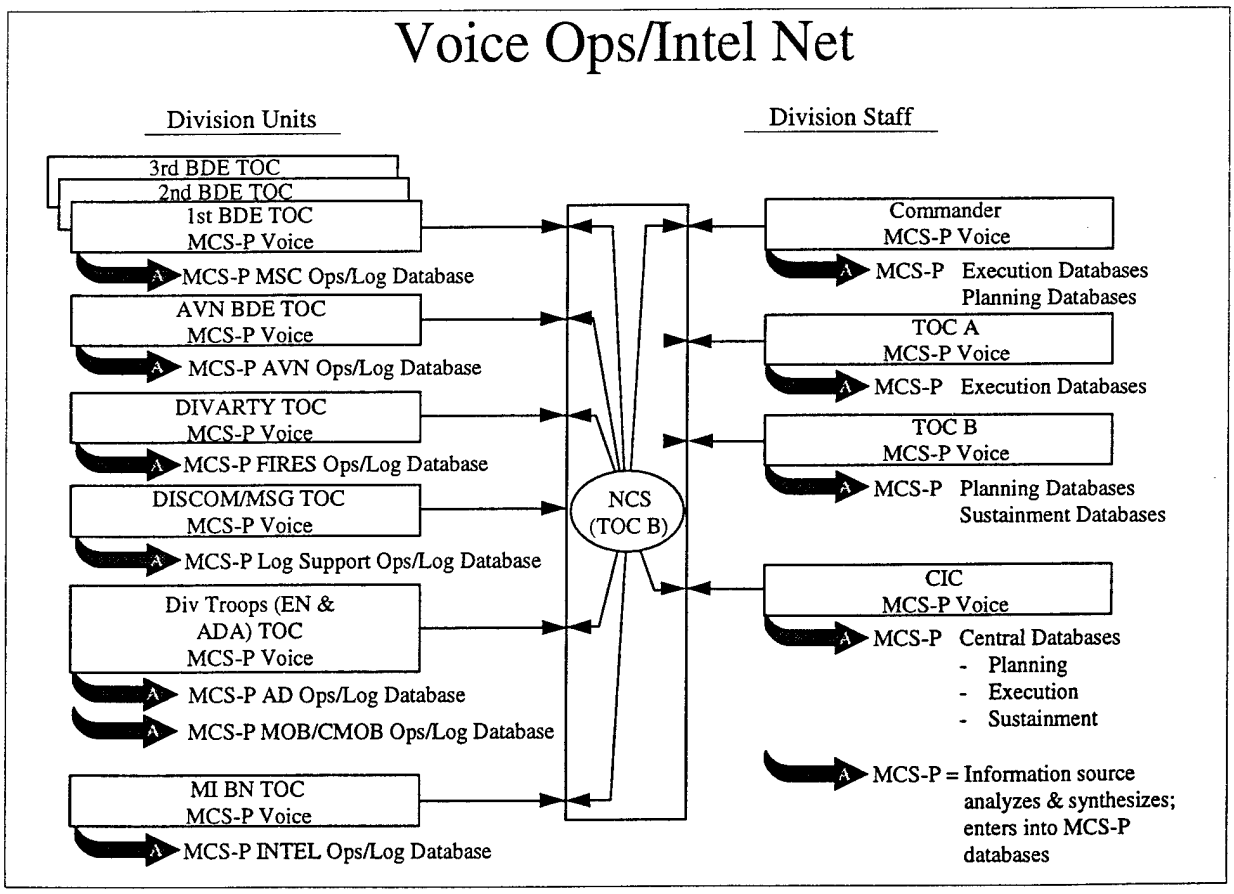

Figure 3-8. The Prairie Warrior 1996 Voice Operations/Intelligence Net

PW95 itself, a voice operations/intelligence net, using bricks, was implemented and PW95 validated the requirement. For PW96, this net is the primary means of voice communications for exchanging urgent operations/intelligence information between the TOCs and the remainder of the MSF. Net control responsibilities belong to TOC B. As with the voice command net, users originating information transmissions on this net have the responsibility for entering that information into the appropriate operations/intelligence databases.

As noted above, PW95 used bricks as the communications means for the voice operations/intelligence net. However, that solution was not ideal for three reasons. First, the bricks were assigned on the basis of one per staff element or subordinate organization with no internal procedures for radio protocol (e.g., answering radio calls). Further, procedures for PW95 did not establish net control responsibilities. Finally, participants did not have the responsibility for ensuring entry of exchanged information into the appropriate databases. For these reasons, and because of the requirement for mobility of the commander, bricks are more suitable for the voice command net. Using the bricks for that purpose will free up the voice capabilities of MCS-P for use as the operations/intelligence net.

3.7.4 Voice Administrative/Logistics Net

Figure 3-9 depicts the administrative/logistics net. The absence of a voice administration and logistics net was noted during PW95 and the SIMEXs preceding it. However, it was not fixed--administrative and logistics data were either not passed, communicated face to face (which is not realistic during the kinds of operations envisioned in the Force XXI concept), passed over point-to-point telephone lines, or communicated via the operations/intelligence net. The requirement for an administrative/logistics voice net is valid and a telephone with a networking/conferencing capability can satisfy it.

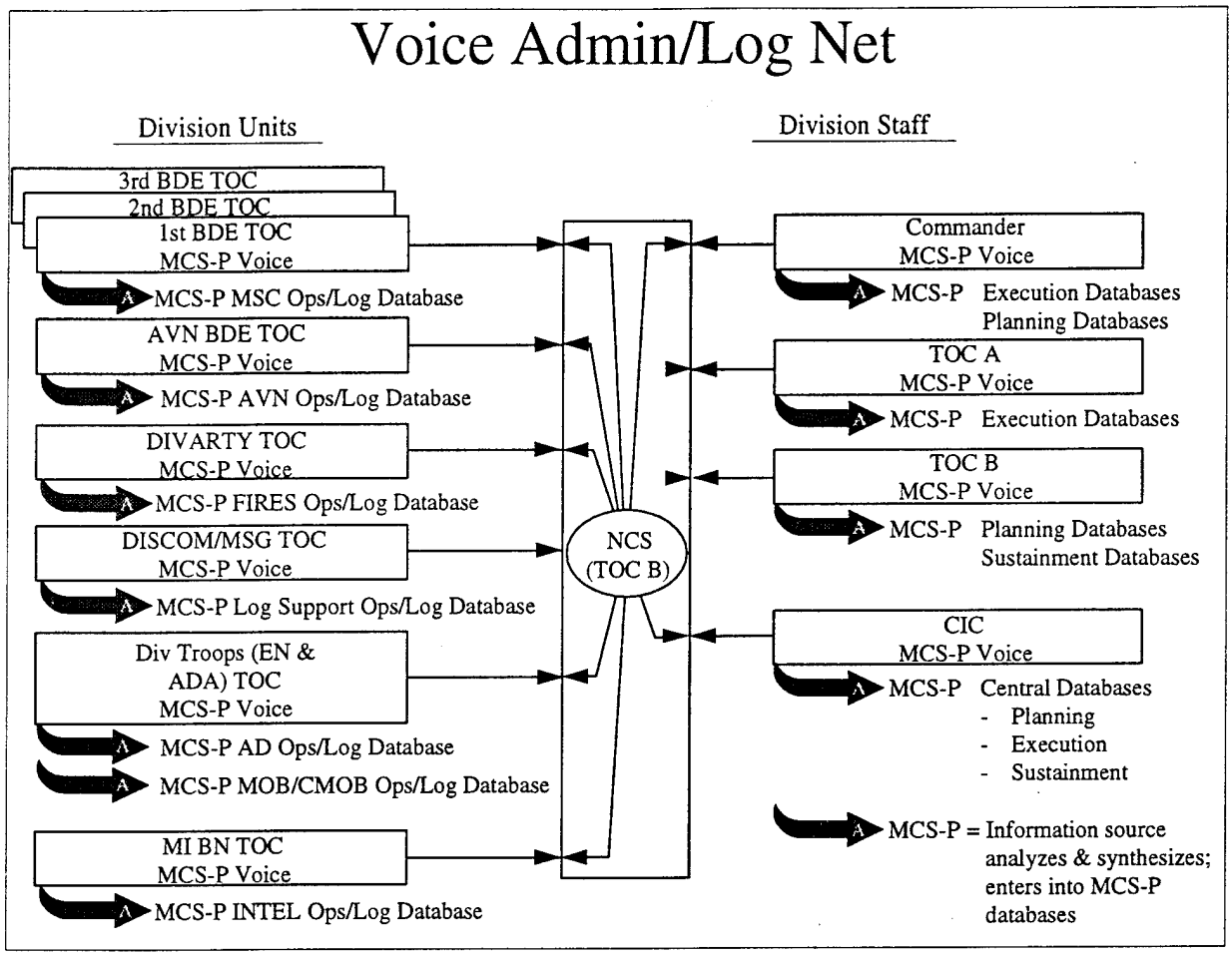

Figure 3-9. The Prairie Warrior 96 Voice Admin/Log Net

The voice administration and logistics net is the primary means of voice communications for exchanging administrative and logistics information between the TOCs and the rest of the MSF. Net control responsibilities belong to the MSF support command (SUPCOM). Users who originate information on this net have the responsibility for entering that information (as appropriate) into the logistics databases. The commander does not normally operate over this net, so he is not indicated on the diagram.

3.8 EXERCISE PW96 INFORMATION NAMING CONVENTIONS

As part of its responsibility to establish and maintain the HQ central database, the CIC must establish information naming conventions for use in distributing information and information products. Recommended naming conventions are described below. These suggested naming conventions utilize the suggested operations plan/operations order (OPLAN/OPORD) annex designators and fixed call signs contained in Annex B to this document.

3.8.1 Flat Files

3.8.1.1 OPLANS/OPORDS

Files containing MSF OPLAN/OPORDS are named as follows:

OPLAN/OPORD Organization's Fixed Call Sign	Order Number

Example: HQ, MSF, OPLAN 95-3 will have the filename of STRIKE95-3.

3.8.1.2 Annexes to OPLAN/OPORD

When transmitted separately, annexes to OPLAN/OPORDs will preserve the OPLAN/OPORD's file name followed immediately by the annex's alphabetic designator:

OPLAN/OPORD File Name	Annex's Alphabetic Designator

Example: the information management annex to HQ, MSF, OPLAN 95-3 is named STRIKE95-3S.

3.8.1.3 Overlays Not Transmitted as Objects Within a Flat File

The preferred method of transmitting overlays is as objects embedded within a flat file and/or a database, using the latest available object linking and embedding (OLE) technology. If this is not possible or not desired, use the following convention.

Original. The file containing the first transmission of an overlay is named as follows:

OPLAN/OPORD File Name and Annex Designator	OLY

Example: the operations overlay to HQ MSF OPLAN 95-3 would be STRIKE95-3COLY.

Updates/Changes. Updates and/or changes to an overlay will be named as follows:

Overlay's Original File Name	Julian Date Of Update/Change	Staff element's superuser assigned serial number for the Julian date

Example: the 2d update on 30 June 1995 of the operations overlay to HQ MSF OPLAN 95-3 would be STRIKE95-3COLY51812

IPB. Overlays used in IPB (e.g., combined obstacle overlay) will be named IAW the template convention below.

3.8.2 Templates

As with overlays, the preferred method of transmitting templates is as objects embedded within a flat file and/or database, as appropriate. However, when transmitting

templates separately, use the same convention as overlays except replace the OLY designator, as shown below.

- MCO for modified combined obstacle overlay
- DOC for doctrinal templates
- _EV for event templates (a prefix of A, before the designator EV, identifies an air event template; similarly, a prefix of G identifies a ground event template)
- _SIT for situation templates (a prefix of A, before the designator SIT, identifies an air situation template; similarly, a prefix of G identifies a ground situation template)
- DST for decision support templates

Users will assign filename extender serial numbers when more than one of the same type template is required. Template examples:

- The 2d update on 30 June 1995 of the ground event template supporting IPB for HQ MSF OPLAN 95-3 is named STRIKE95-3BGEV51812
- The 3d update on 30 June 1995 of the air event template supporting IPB for HQ MSF OPLAN 95-3 is named STRIKE95-3BAEV51813

3.8.3 Other Documents (including reports)

Originator's Fixed Call Sign	Document Julian Date	Originator's Assigned Serial Number	Type Report (SPOT, SALUTE, SHELL, and SPLASH only)

Example: the third SPOT report of 30 June 25, 1995 issued by TOC A would be named STRIKEALPHA951813SPOT.

3.8.4 Data Bases

The MSF CIC assigns all MSF data descriptions using five alpha characters. Current data descriptions are as listed below. MSCs will request additional data descriptions.

- ENSIT: Enemy situation data.
- FRSIT: Friendly situation data.
- AD___: Air Defense data, including A2C2.
- AV___: Aviation data.
- CSS__: Logistics data, including personnel.
- MCM__: Mobility, counter-mobility, and survivability data, including NBC.
- FS___: Fire support data, including joint air data.
- INT___: Intelligence data.

3.8.4.1 Database Naming

MSF data bases are named as follows:

Originator's Fixed Call Sign	Data Description	Julian Date of Data	Superuser Assigned Serial Number

Example: The CIC's second update to the friendly situation database on 30 June 1995 would be named STRIKECHARLIE9FRSIT51812.

3.8.4.2 Database Proliferation

To reduce data base proliferation and ensure interoperability, MSF users will submit data base requirements and data base construction specifications to the MSF CIC for approval. They will submit these requests via MCS-P and, as a minimum, will provide a data base purpose description followed by schema, table, field, and record specifications.

COMBAT INFORMATION CENTER CONCEPT

ANNEX A

FRAGMENTS, STOVEPIPES, AND HANDOFFS

SECTION 1

BACKGROUND

1.1 PURPOSE

This annex outlines the effects that staff fragments, stovepipes, and handoffs have on staff functioning and resource requirements

1.2 DEFINITIONS

1.2.1 Fragment

An area of an overall process that is both a specialized part of the process-- a tiny part of an overall task--and separated from the rest of the process (the amount or type of separation does not matter, just that some amount exists). Because we tend to organize to accomplish processes, the term also applies to that part of a larger organization that performs the specialized part of the process.

1.2.2 Stovepipe

A vertically integrated fragment. In most cases, this vertical integration is not yet perfected.

1.2.3 Handoff

The set of actions that occur when one individual sends an information set to another. A handoff includes deciding what information to send, developing that information, sending it, receiving it, comprehending it, developing a response, and responding--if only by ignoring the information.

1.3 GOAL

The cause for this discussion (of the effects of fragments, stovepipes, and hand-offs on staff support to the science of control) is the basic overarching goal of conserving vital resources. These resources are tempo and time, people, and information.

1.3.1 Tempo and Time

The importance of tempo and time are best explained in Training And Doctrine Command (TRADOC) Pamphlet 525-200-1, *US Army Battle Dynamic Concept, Battle Command,* 1 December 1994:

> Tempo is the measure of time between and the sustained frequency of militarily significant events.... Future battles will have an increased tempo of operations which requires the commander to be able to move his forces rapidly, destroy the enemy quickly, and reset for subsequent operations before the enemy can recover or respond.... Tempo is not synonymous with speed. Sometimes, we wish to increase our own tempo and slow the enemy's. Other times, we may wish to slow our operations and induce the enemy to hasten his. On the battlefield the commander who can master time will spare his forces and defeat the enemy.
>
> Time has always been a dimension of combat. Today time is more important than ever before. We speak of "real-time"

> intelligence. Synchronization--in which time, along with effect, is an implicit subelement--is one of the Army's doctrinal elements. Force projection is done over time. Time is referred to as the fourth dimension, but in today's battles perhaps it is the first.
>
> The commander who dominates the time dimension controls the physical dimension as well.

In summary, a staff that supports a commander's ability to control tempo and master time significantly enhances the probability of, or ensures the realization of, that commander's success.

1.3.2 People

Soldiers are, according to FM 100-5, "...the foundation of the Army's will to win. Their spirit, initiative, intelligence, discipline, courage, and competence comprise the basic building blocks of a victorious Army." People have always been an overwhelmingly important resource. But, with the change in world environments, and the associated changes in military strategy and accompanying resources to execute that strategy, people have become more important than ever before. Simply put, we can't afford to waste people--we don't have enough to do the things we must now do. In the future, wasted people will become more dysfunctional because of the dramatically escalating costs of producing and/or replacing the increasingly higher-quality people the Army and its commanders must have.

1.3.3 Information

The Combined Arms Center's (Battle Command Battle Laboratory) *Battle Command Concept* briefing addresses, in detail, the key role that information plays in operational success. The briefing culminates in a discussion of the RCP--the key to commanders seeing "...the battle wherever they are located; enabling them to lead and

decide...." The relevant common picture--a form of information--empowers commanders "...to act decisively while minimizing ambiguity, confusion, and uncertainty."

ANNEX A

FRAGMENTS, STOVEPIPES, AND HAND-OFFS

SECTION 2

DISCUSSION

2.1 THE IMPACT OF HANDOFFS

Thus, tempo and time, people, and information are vital resources that commanders and their staffs must jealously guard and protect. Yet, we tend to use more than we should and, indeed, consume those resources at an alarming rate. Much of the cause can be found in our process of information transmission.

2.1.1 Handoffs Require Time

No matter how simple or complex an item of information is, each time an individual transmits information it consumes time. The variable is how much time--but just the simple act of transmission uses time. For the purposes of this paper, the entire span of a transmission activity (defined as deciding what information to send, developing that information, sending it, receiving it, the recipient's comprehending it, the recipient's developing a response, and the recipient's responding--if only by ignoring the information) is called a "handoff." The more handoffs that occur, the more time is consumed. Further, while automation can reduce the time used (typically by enabling parts of the handoff to occur in parallel or nearly parallel, rather than in the sequence presented above), it can never entirely eliminate the use of time for handoffs. In fact, there is a distinct danger that

unwisely developed or used automation will increase the time required for handoffs. Thus, a commander's ability to control an operation's tempo or to master time will be inversely proportional to the number of handoffs that occur during any given activity. From the perspective of a commander and his staff, handoffs are the enemy of a commander's ability to control tempo and to use time to his advantage.

2.1.2 Handoffs Require a Sender and Receiver

A handoff requires a sender and a receiver. Automation can help reduce the total numbers of people involved, but any handoff requires at least two people who must decide, develop, send, receive, comprehend, develop, and respond. From the perspective of a commander and his staff, handoffs are the enemy of a "...lean and agile staff." Handoffs require people in a simple direct proportion--the more handoffs that occur, the more people are required; automation, at best, only reduces the slope of the incline.

2.1.3 Handoffs Consume Information

Handoffs actually consume information--any time a handoff occurs, information disappears in at least one of two ways--and usually both.

The first way information disappears is physically. Electrical interference, aural interference, visual interference, forgetfulness (because of fatigue from a nonstop operation, perhaps?) and mistakes are but a few examples of things that can cause information to disappear. In normal times, most interference is unintentional. During military operations, this interference often is intentional (it's called command and control warfare). Regardless, for any given handoff, the receiver will either not receive or not comprehend at least a small part of what the sender intended the recipient to receive. Automation can almost eliminate all physical information loss except that caused by

mistakes. Unfortunately, automation also tends to aggravate and/or perpetuate mistakes via the "garbage-in/garbage-out" phenomena (interestingly, the more people that are involved, the more mistakes will likely occur--see the discussion above about people requirements).

Another kind of information loss in a handoff is virtually unavoidable. "Hidden information" never gets transmitted. In fact, much of it exists only subconsciously--at the intuitive level.

Hidden information goes by many names--implicit assumptions, implicit tasks, vision, thought processes, understanding, prejudices, heuristics, background--whatever the name, hidden information is just as important to success as volumes of information in plans, orders, SOPs, books, and other sources. Hidden information helps the sender decide what other information to send. Hidden information helps the receiver comprehend that information, figure out what to do with it, and then to respond.

Unfortunately, hidden information is much more perishable than other kinds of information; not only do senders almost never send it, the receiver's ability to use it may be nonexistent, or, at best, easily degraded. The ability of automation to help with hidden information loss is negligible. Expert systems and other types of artificial intelligence, however, can turn some amount and types of hidden information into physical information. Other means to prevent or cope with hidden information loss also exist. Some relatively recently developed procedures--such as that found in the institutionalization of the commander's intent statement--are designed to turn hidden information into physical information. Some programs, such as training and education or leader development, are designed to ensure that a shared database of hidden information exists, thereby negating the need for transmitting some hidden information. But, as long as people are required and handoffs occur, hidden information will be lost in the handoff process.

Handoffs eat information. From the perspective of a commander and his staff, handoffs are the enemy of information, of the relevant common picture, and of understanding.

2.1.4 Handoffs Are Never Eliminated

Handoffs will never be eliminated. In fact, they are essential--the requirement for them will, in all likelihood, remain quite large. However, an indispensable key to a commander's ability to control operational tempo, to use time to his advantage, to have a lean and agile staff, and to have and share a relevant common picture is reducing handoffs to an absolute minimum.

2.2 THE IMPACT OF FRAGMENTS

The existence of process fragments (functionally, organizationally, or, usually, both) is a second major cause of overusing or over consuming time and tempo, people, and information.

2.2.1 Fragment - A Specialized Part of the Process

A fragment is any area of an overall process that is both a specialized part of the process--a tiny part of an overall task--and separated from the rest of the process (the amount and type of separation does not matter, just that some amount exists). The term also applies to that part of a larger organization that performs the specialized part of the process. An industrial assembly line is a good example of process fragmentation--it comprises a series of process fragments. Fragments have a long history in industrialized cultures and are codified in such works as Adam Smith's approach to the division of labor.

2.2.2 Fragments Reduce Ability to Hand Off

The specialization inherent to fragments inhibits or prevents handoffs. In one respect, this is good if the information involved in the handoff is irrelevant. However, fragments are indiscriminate--they interfere with or prevent information exchange and people interaction regardless of the relevance of the information involved. Fragmentation has this particularly bad affect because it breeds either the inability or a reduced ability to comprehend--fragmentation eats information.

2.2.3 More Fragments Require More People

Fragmentation increases the number of people required for an activity or process.

First, fragments increase staff work associated with irrelevant information in terms of increasing the requirements for gathering information, attempting handoffs, and completing handoffs. An individual within a fragment normally does not have a larger picture of the whole process. Typically, no one (including the boss) within a fragment has that picture unless a great amount of effort goes into providing it to the fragment (this effort itself is expensive in terms of handoffs). As a result, people in the fragment tend to try to gather all information about the fragment's area of specialization because no one knows what information is needed and no one can identify what is and is not relevant. Then, to aggravate the problem, the fragment tries to hand off all of its information, both relevant and irrelevant.

Second, by themselves, fragments tend to promote an overall increase in the number of handoffs that occur within an organization. This happens simply because the fragments exist. We've already discussed the impact on people requirements that is associated with the numbers of handoffs that occur.

In summary, fragments have a quadruple impact on increased requirements for people:

- To gather, handle, and attempt to send irrelevant information
- Outside the fragment, to be on the receiving end of the irrelevant information
- To handle the increased number of handoffs that fragments cause just because they exist
- To maintain and operate a communications infrastructure that is larger than necessary.

2.2.4 Irrelevant Information Affects

Of course, all this involvement with irrelevant information takes time that cannot be controlled (by definition, control has already been relinquished). As a result, the commander has a decreased ability to control tempo and to master time.

Equally as important, however, is the affect of irrelevant information on commanders. "As information goes up stovepipes [i.e., vertically integrated fragments], regardless of its relevance, it competes with other information arriving simultaneously. Commanders must then discern the important from the urgent, because staffs have failed to do it for them." (Comment by Lieutenant General Miller, then Commanding General, Combined Arms Command, during the Battle Command Assessment Update Briefing on February 25, 1994.)

2.2.5 Fragments Require Larger, More Complex Support

Fragmentation tends to create overly large organizations that are ponderous in the conduct of their activities. Some degree of specialization is absolutely essential. Thus, fragmentation will occur in most organizations that are engaged in complex, demanding activities. However, another principal key to a commander's ability to control tempo, to use time to his advantage, to have a lean and agile staff, and to have and share a relevant common picture is reducing fragments and stovepipes to a minimum.

ANNEX B

TACTICAL STANDING OPERATING PROCEDURES EXTRACT

1. PURPOSE

This annex supplements the discussion in section 3, paragraph 3.8, Information Naming Conventions. This tactical standing operating procedures (TACSOP) extract provides the fixed call signs and operations plan annex schema used in the information naming conventions. However, the schema addressed below are applicable only to this document and are not necessarily those the mobile strike force (MSF) commander will use during PW96 or the SIMEXs preceding it.

2. OPERATIONS PLAN/OPERATIONS ORDER ANNEXES

The MSF uses the following guide for annexes. The MSF also uses these annex designators as part of the information naming conventions.

Annex A	Task Organization
Annex B	Intelligence
Annex C	Operations overlay/Concept of Operations
Annex D	Engineer
Annex E	Army Aviation
Annex F	Air Defense
Annex G	Fire Support
Annex H	Army Airspace Command and Control (A2C2)

Annex I	Electronic Warfare
Annex J	Signal Operations
Annex K	Deception
Annex L	Psychological Operations
Annex M	Nuclear, Biological, and Chemical Defense/Smoke Operations
Annex N	Military Police
Annex O	Rear Operations
Annex P	Service Support
Annex Q	Movement
Annex R	Civil Affairs
Annex S	Information Collection And Management
Annex T	Reconnaissance and Security

3. FIXED CALL SIGNS

On enemy contact, the MSF uses the following fixed call signs when using secure communications. The MSF also uses these fixed calls signs as part of the information naming conventions.

Element	Designator
HQ MSF	STRIKE
Command Group	STRIKE TETHER
HQ Main Body	STRIKE XRAY
TOC A	STRIKE ALPHA
TOC B	STRIKE BRAVO
CIC	STRIKE CHARLIE

lst Brigade	STEEL
2d Brigade	BAYONET
3d Brigade	BULLDOG
Aviation Brigade	EAGLE
MSF Artillery	GUNNER
MSF Support Command	MULE SKINNER
Engineer Brigade	SAPPER
MI Battalion	DAGGER
ADA Battalion	SKY SWEEPER
Signal Battalion	SPARKS
MP Company	SHERIFF
Chemical Company	DUPONT
PSYOP Company	SHRINK

Position	Designator
Commander	6
ADC/XO	5
Staff Element Chief	9
Deputy	Suffix B
CSM	7
Intelligence	1
Operations	2
Logistics	3
Personnel	4
Civil Affairs	8
Scout/Reconnaissance	10
Maintenance	30

Fire Support	20
Chemical/NBC	21
Air Liaison Officer	22
Air Defense/A2C2	23
Engineer	24
Signal Officer	25
Provost Marshal/MP	26
Inspector General	44
Public Affairs	40
Staff Judge Advocate	41
Chaplain	42
Surgeon	43

Suffixes	Designator
Air Operations	2 ALPHA
Liaison	LIMA
Net Control Station	NOVEMBER
Driver	DELTA
Pilot	PAPA
Radio Operator	ROMEO
Scribe	SIERRA